

AKHLAK-BASED INTELLIGENT MULTI-AGENT ARCHITECTURE

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AKHLAK-BASED MULTI-INTELLIGENT AGENT ARCHITECTURE

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Coordination in socially intelligent agents is imperative because actions produced by the agents, without any deliberation on its consequences, may have non-local effects. These non-local effects will lead to a possibility of inefficient performance of the individual and the system. Socially intelligent agents can be best described as autonomous problem solvers that have to achieve their objectives by interacting with other similarly autonomous entities. The reason that such agents are inherently social makes the agents must produce decisions that are not only rational from the perspective of the individual agent but also rational from the perspective of the society. To solve the above problems we propose Akhlak coordination model stems from Akhlak concept to help and guide the agents to coordinate their tasks with other members. The model will be design as a social component of an agent-based architecture called Multi-agent Linkage Social Intelligent (MALSI) architecture. MALSI architecture that associated with Akhlak model is realized in an exemplar computational setting: a case study and a series of experiments are made of the relative performance of the model functions in a two different environment: homogeneous and heterogeneous environments. The case study measures

performance of the system aided MALSI agent (embedded with Akhlak model) in perspective of users and designers of the system. The experiments measure coherency of multi-agent, which mean, how well the agents behaves as a unit, along some dimension of evaluation. The case study and the experiments are conducted in real-life industry in government agencies: Malaysian Administrative Modernization and Management Planning Unit (MAMPU) and Ministry of Education (MOE).

**Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains**

SENIBINA MULTI-AGEN CERDAS BERASASKAN AKHLAK

Oleh

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November 2006

Pengerusi: Profesor Madya Abdul Azim Abd Ghani, PhD

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Penyelarasan dalam sosial pintar ejen-ejen adalah penting kerana tindakan-tindakan dihasilkan oleh ejen-ejen, tanpa sebarang perbincangan di akibatnya, mungkin mempunyai bukan tempatan kesan-kesan. Ini bukan tempatan kesan-kesan akan mengetuai kepada kemungkinan prestasi tidak cekap individu dan sistem. Dari segi sosial pintar ejen-ejen boleh jadi paling baik disifatkan sebagai penyelesaian masalah bebas bahawa terpaksa mencapai objektif-objektif mereka oleh berinteraksi dengan lain serupa bebas entiti-entiti. Sebabnya ejen-ejen seperti perlu mengeluarkan keputusan-keputusan yang rasional dari perspektif ejen individu dan juga dari perspektif masyarakat. Untuk menyelesaikan masalah-masalah atas kita mencadangkan Akhlak model berasal dari Akhlak konsep untuk membantu dan panduan ejen-ejen untuk membuat menelaraskan aktiviti-aktiviti mereka. Konsep Akhlak adalah berasal daripada kepunyaan pintar agen pintar: keupayaan sosial. Dalam penyelidikan ini, kita telah menerbitkan ciri-ciri untuk konsep ini dan menambah tiga ciri-ciri tambahan: sosial reaktif, sosial proaktif, sendiri kaji diri. Senibina MALSI digabungkan

dengan Akhlak model dilaksanakan dalam satu contoh latar dan satu kajian kes serta satu siri dari eksperimen-eksperimen dibuat dalam dua persekitaran: persekitaran homogen dan heterogen. Kajian kes langkah-langkah prestasi sistem membantu ejen MALSI (ditanam dengan model Akhlak) dalam perspektif pengguna-pengguna dan pereka-pereka sistem. Eksperimen-eksperimen langkah pertalian bagi multi ejen yang bermaksud betapa baik ejen-ejen berkelakuan seperti satu unit, seterusnya beberapa dimensi penilaian. Kajian kes dan eksperimen-eksperimen dikendalikan dalam industri kehidupan sebenar: Pemodelan Pengurusan yang Rakyat Malaysia dan Unit Perancangan Pengurusan (MAMPU) dan Kementerian Pendidikan (MOE).

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Azree Shahrel Ahmad Nazri

July 2006

I certify that an Examination Committee met on November 2006 to conduct the final examination of Azree Shahrel Ahmad Nazri on his Master of Science thesis entitled “Akhlah-based Intelligent Multi-Agent Architecture” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

AZREE SHAHREL AHMAD NAZRI

Date: 11 November 2006

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LIST OF ABBREVIATIONS

MALSI	Multi-Agent Linkage Social Intelligent
SDA	System Development Approach
IGS	Information Gathering System